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299 1854

Mash-tubs.

RECORDED



A.D. 1854 . . . . . N° 663.

# Apparatus for Brewing.

**LETTERS PATENT** to James Young, of East Smithfield, in the County of Middlesex, Gentleman, for the Invention of "**IMPROVEMENTS IN BREWING.**"

Sealed the 30th May 1854, and dated the 20th March 1854.

**PROVISIONAL SPECIFICATION** left by the said James Young at the Office of the Commissioners of Patents, with his Petition, on the 20th March 1854.

I, JAMES YOUNG, of East Smithfield, in the County of Middlesex, Gentleman, do hereby declare the nature of the said Invention for "**IMPROVEMENTS IN BREWING**" to be as follows;—

The Invention consists in boiling ale and porter worts for brewing under a vacuum or partial vacuum, and for this purpose I apply the well-known vacuum pan used in sugar refining, with such modification and adaptations, however, as to suit it to the materials to be operated upon. The boiling apparatus should have a volume gauge, a barometer gauge, and a thermometer, and a rouser to give continuous motion to the hops; and in some cases a hop back or strainer is inserted, on which, after the proper time of boiling the worts, on running off the contents, the spent hops are collected and reserved for further operations.

After charging the apparatus with worts and the hops it is exhausted of the air, and the progress of the vacuum thus made is indicated by the rapid fall of the barometer gauge to 4 or 5 inches; then the steam for heating is turned on into the steam chamber of the apparatus, the temperature rapidly rises, and the



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boiling takes place at a lower temperature than under the common pressure of the air. When desired, as it may be occasionally, air is admitted by opening a cock, when the vacuum being for the time destroyed, the temperature will rise to the ordinary boiling point of atmospheric pressure. The apparatus is exhausted of air by the pump attached to the condenser, and the condensed water and steam 5 are afterwards pumped out as fast as they collect in the receiver or condenser. The pumping is continued until the completion of the process of boiling, during which a tolerably perfect vacuum and rapid evaporation are maintained. In draining off the wort from the hops in the apparatus advantage may be use- 10 fully made of a partial exhaustion on the under side, and the whole atmospheric pressure applied to the upper, when the worts will be drawn off with increased celerity. This principle may be also applied to the quicker draining off of the worts from mash tuns, in which case a partial vacuum is produced below the mash, and the full atmospheric pressure applied at the top either with or with- 15 out a cover to the tun. By this means the mash may be more quickly drained than under the ordinary methods. Occasionally it will be found useful to empty the boiling apparatus into another vessel, wort and hops together, and then to strain off the clear worts.

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**SPECIFICATION** in pursuance of the conditions of the Letters Patent, filed by the said James Young in the Great Seal Patent Office on the 20th 20 September 1854.

**TO ALL TO WHOM THESE PRESENTS SHALL COME**, I, JAMES YOUNG, of East Smithfield, in the County of Middlesex, Gentleman, send greeting.

**WHEREAS** Her most Excellent Majesty Queen Victoria, by Her Letters 25 Patent bearing date the Twentieth day of March, in the year of our Lord One thousand eight hundred and fifty-four, in the seventeenth year of Her reign, did, for Herself, Her heirs and successors, give and grant unto me, the said James Young, Her special licence that I, the said James Young, my executors, administrators, and assigns, or such others as I, the said 30 James Young, my executors, administrators, and assigns, should at any time agree with, and no others, from time to time and at all times thereafter during the term therein expressed, should and lawfully might make, use, exercise, and vend, within the United Kingdom of Great Britain and Ireland, the Channel Islands, and Isle of Man, an Invention for "**IMPROVEMENTS IN** 35 **BREWING,**" upon the condition (amongst others) that I, the said James



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Young, by an instrument in writing under my hand and seal, should particularly describe and ascertain the nature of the said Invention, and in what manner the same was to be performed, and cause the same to be filed in the Great Seal Patent Office within six calendar months next and immediately  
5 after the date of the said Letters Patent.

NOW KNOW YE, that I, the said James Young, do hereby declare the nature of my said Invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement thereof, reference being had to the Drawings hereunto annexed, that is to  
10 say :—

My Invention consists in boiling porter and ale worts for brewing under a vacuum or partial vacuum. For this purpose I employ, without reference to form or construction, any closed boiling apparatus wherein or in connection wherewith a vacuum or partial vacuum can be produced, either by means of  
15 an air pump or otherwise; and I heat such an apparatus either by steam applied internally (as by a coil, or worm, or set of pipes running through the apparatus), or externally (as by a steam jacket or casing), or by hot vapour or other heated medium, or by the agency of the direct heat of a furnace or fire-place. As one construction of the boiling apparatus, I apply the well-known  
20 vacuum pan used in sugar refining, with such modifications and adaptations, however, as to suit it to the materials to be operated upon; but I repeat that I do not confine myself to the use of this or any other particular construction of boiling apparatus, so long as the same is suitable for enabling my Invention of boiling the worts for brewing under a vacuum or partial vacuum to be per-  
25 formed therein. The boiling apparatus, however constructed, should have a gauge, a barometer, or vacuum gauge, and a thermometer, and in large vessels it will be found that a coil of pipes for the application of steam internally, in addition to the steam jacket applied externally, will be advisable, to promote boiling with greater rapidity. In such cases it will be serviceable to employ a  
30 protector of perforated copper to prevent the hops adhering to the coil, and in some cases a rouser to give continuous motion to the hops; and a hop back or strainer may be introduced, on which, after boiling the worts and running them off, the spent hops may be collected. This mode of operation may be also employed for the quicker draining off the worts from mash tuns, in which case  
35 a partial vacuum is produced below the mash, and the full atmospheric pressure allowed to act on the upper surface thereof; and when applying the vacuum principle to the quicker draining off of mash tuns it is advisable to cover over or insert a piece of sponge into the taps (and likewise a strainer to prevent the sponge by force of the vacuum being drawn down the tap, and plugging it up



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or passing entirely through), in order to allow only the clear wort to flow. By this means the mash may be drained off more quickly than under the ordinary methods. Where more than one boiling apparatus or copper is used they may be connected by pipes, and the thin rarefied vapour or the steam rising from the first may be conveyed through the coil or heating medium to the second, and so on to the third, fourth, &c., before pumping away the rarefied air to the condenser or blowing off the steam. In certain circumstances practical men may adopt this plan where great concentration of wort is required, or where a strong hop extract is wanted, without much expense in fuel and with great saving in time. 10

Figure 1 of the Drawings annexed is a side elevation of a vacuum pan for boiling porter and ale worts according to my Invention; Figure 2 is a section of the same; Figure 3 is a plan; Figure 4 is an end elevation; and Figure 5 a view of the test tube; Figure 6 shews the method of mounting the apparatus on a brewer's stage. A is the upper copper hemisphere, and B the lower copper hemisphere, which together compose the pan; C is an iron casing or jacket, which encloses the lower hemisphere B; D is the space between the jacket and the lower hemisphere, in which the steam circulates and boils the worts; E is the flanged junction of the hemispheres, which are bolted together so as to make a perfectly air-tight joint; F is a pipe through which the air is pumped out of the apparatus; G is the wort main; H is the sample tap, fitted in an air-tight stuffing box; M is the volume gauge; N, the steam supply pipe; O, the waste and condensed steam pipe; and P, the air vent from steam space; Q is a tap for destroying the vacuum when required; R is a rouser, which may be used, if found necessary, for large quantities; S is the valve and connection for discharging contents; T is the main through which worts alone will be pumped; U is a safety tube; and V, a vessel in which any steam pumped off along with air will be condensed. 20 25

The mode of operating with the apparatus is as follows:—After charging the apparatus with the wort or wort and hops, the mode of boiling will vary according to the nature and quality of the product required. The exhaustion of air having commenced, the steam for heating is turned on into the steam chamber or coil of the heating apparatus, the temperature rapidly rises and boiling takes place at a much lower temperature than under common atmospheric pressure. The apparatus is exhausted of air while the boiling process continues by the air pump or other exhauster, and the condensed water and steam are by the same process pumped out as fast as they collect in the condenser or receiver; during the boiling process the rapidity of evaporation is in proportion to the perfection of the vacuum. For common weak beers it is recommended to boil at first a 30 35



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short time under the ordinary atmospheric pressure until the "clearing of the worts;" when this effect is produced, then exhaustion of the air by working the pump or exhauster attached to the condenser may be begun, and the progress of the vacuum thus made is indicated by the rapid fall of the mercury in the  
5 barometer or vacuum gauge. As the celerity of evaporation bears a close relation to the perfection of the vacuum, the attention of practical men will naturally be directed to the drawing of samples, in order to ascertain their specific gravity or density by the saccharometer, and they will be guided accordingly in the length of time for continuing the boiling. The worts are  
10 then drained off, either with or without the hops, according as the apparatus is or is not provided with a hop back or strainer; when required, as it may be occasionally, air is admitted to the pan by opening the valve or cock Q, when the vacuum being for a time destroyed, the temperature will rise to the ordinary boiling point of atmospheric pressure. The boiling may be continued thus to  
15 its completion, or the vacuum may be again produced and continued until the boiling process is completed. The foregoing descriptions of the modes of operating will apply equally to other constructions of apparatus than that shewn in the Drawings. The mode of drawing off liquor infusions or worts from mash tuns by the aid of a partial vacuum will be readily understood without  
20 the assistance of a drawing, all that is necessary being to connect a pipe from the air pump or other exhauster to the under back or other receiver of the worts or infusions while draining from the tun.

And having now described the nature of my said Invention, and in what manner the same is to be performed, I declare that what I claim as my  
25 Invention is,—

First, the boiling of porter and ale worts for brewing under a vacuum or partial vacuum.

Second, the mode of drawing or draining off the liquor infusions or worts from mash tuns by the aid of a partial vacuum.

30 In witness whereof, I, the said James Young, have hereunto set my hand and seal, this Twentieth day of September, One thousand eight hundred and fifty-four.

JAMES YOUNG. (L.S.)

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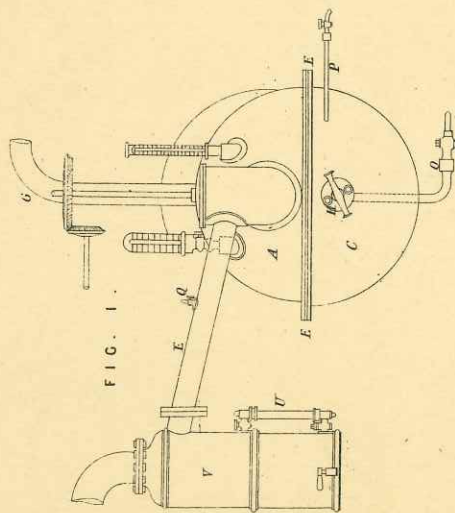


FIG. 1.

FIG. 2.

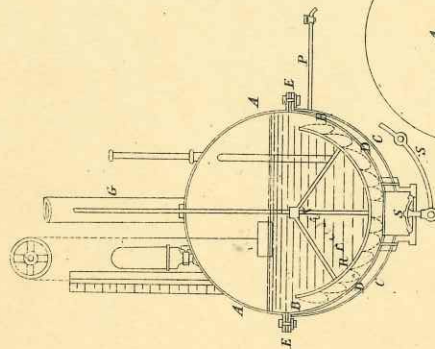


FIG. 4.

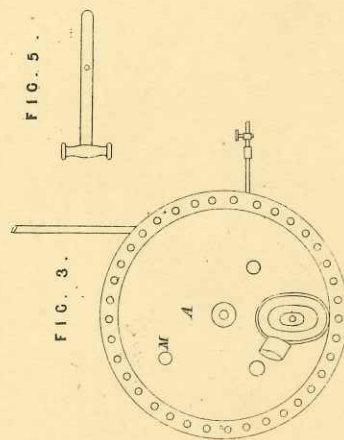
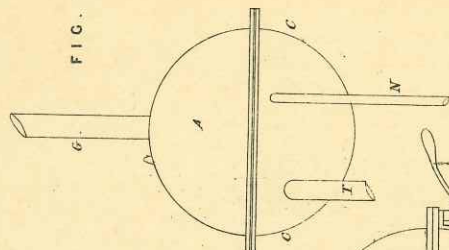
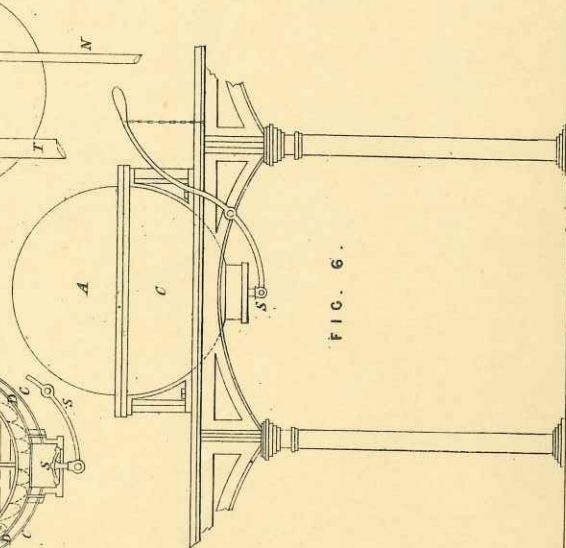


FIG. 5.



FIG. 3.

FIG. 6.



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